CHAPTER 10.0 NEAR-TERM SOLUTIONS

The UDOT requested a set of near-term solutions that would improve the mobility in the study area within the next five years. This chapter presents a plan and budget for making some improvements in the near term.

10.1 NEAR-TERM SOLUTIONS

In an effort to identify some near-term solutions based on the information gathered and evaluations performed for this study, the study team met with some key UDOT Region 2 leaders to discuss and identify viable near term solutions for the study area. The intent of the meeting was to identify improvements that would improve the mobility in the area with as little right-of-way impact as possible and as economically as possible.

At this meeting, the team discussed and identified choke points and capacity-deficient corridors and intersections in need of improvement. The team then reviewed and selected possible low-cost solutions to improve the poor operational conditions at these locations. The different types of improvement treatments are described in the next sections.

10.1.1 High-Capacity Intersections

High-capacity intersections, also commonly referred to as innovative intersections, are economical intersection treatments that move cars in a way to improve signal timing efficiency (in most cases). These less-conventional intersection treatments are increasing in popularity because of right-of-way constraints and growing traffic volumes in developed urban areas. In many cases, these intersection treatments are able to increase intersection capacities without the need to grade separate or add lots of lanes.

High-capacity intersections are located throughout the United States. Some of the treatments, like the Continuous Flow Intersection (CFI), are less common than others but are gaining popularity as confidence increases in the benefit and safety of these intersections. For example, several CFIs are operational throughout the United States, and all of them have provided substantial improvement while receiving very positive local agency and public feedback. Figure 10-1 is an illustration of a CFI.

Figure 10-1. Continuous Flow Intersection

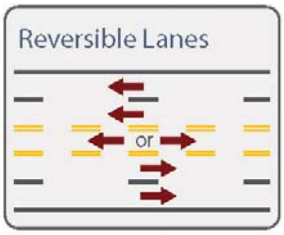
Several locations were discussed that would benefit from a high-capacity intersection treatment, likely a CFI similar to the one that was successfully implemented at the 3500 South and Bangerter Highway intersection. These intersections provide extended life for an intersection without the need for grade separation. Several intersections along Bangerter Highway and Redwood Road were identified for consideration of this type of treatment. These locations are major choke points in east-west travel within the study area. The intersection treatments could also improve the traffic mobility in the north-south direction.

Intersection treatments, like the CFI, typically cost between $4 to 10 million. Others can have reduced costs depending on the existing right-of-way and adjacent infrastructure.

10.1.2 Reversible Lanes

A reversible lane is an arterial treatment that utilizes a common lane, usually in the center of the road, to serve an additional lane of traffic for the peak hour direction. This lane usually serves as a two-way left turn lane during off-peak hours and restricts left turns during the peak hours when the lane is utilized as a travel lane. The intent of this improvement is to create additional capacity during the peak congestion hours of the day.

Figure 10-2. Reversible Lane Illustration



There are several cities in the United States that have implemented reversible lane treatments. Two examples are located in Omaha, Nebraska, and Phoenix, Arizona. Dodge Street in Omaha is a five-lane, east-west road in and out of Omaha. In Phoenix, 7th Street and 7th Avenue are both six-lane, north-south reversible lane streets that are located one mile apart from each other, just north of downtown Phoenix. On both of these facilities, three lanes are provided northbound and two lanes are provided southbound with the center left turn lane becoming a reversible travel lane for the peak hours. The City of Phoenix is currently studying whether or not to remove these reversible lane treatments, which have been operating since the early 1980s.

The study team traveled to Phoenix to observe the reversible lanes, to meet with the City staff and to discuss the ongoing studies, including the pros and cons of peak direction lanes. In summary, the reversible lanes appeared to provide smooth traffic flow during the peak hours while serving 30,000 to 40,000 average daily traffic (ADT). Various pros, cons, and other observations were identified.

Pros:

- Increased capacity over traditional arterials.
- Low budget.
- Innovative.
- Traffic delay reduction has potentially big environmental improvements (in terms of air quality).
- Takes advantage of unutilized infrastructure (asphalt).
- Eliminating left turns at intersections could provide additional capacity with improved capability for signal coordination along the corridor.

Cons:

- Challenging political and public acceptance.
- Safety and accident concerns.
- Potential for high speed differential.
- Potential for reduced lane utilization in reversible lane compared to a permanent travel lane.

Observations:

- Access limitations may have an impact on the existing or future adjacent property land use.
- Clarity, number, and location of signing are critical to successful implementation (e.g., provide side street signing).
- Width of reversible lane is too narrow (11 feet).

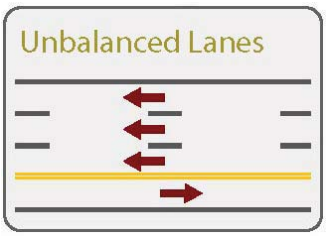
- Apparent lack of enforcement.
- Land use along the corridors was more residential than commercial.
- The termini locations/intersections need to accommodate the demand.
- The reversible lanes served a core destination–downtown.
- Compromises between accessibility and efficiency will likely be necessary.
- Current technology could improve safety and efficiency of the treatment (e.g., rumble strips, illuminated signs, blank-out signs, etc.).

Treatments like reversible lanes are often not very expensive with roadways that already provide a two-way left turn lane. The cost for these treatments is usually limited to additional signing to manage the lanes, striping modification to align intersections, and signal enhancements. An anticipated cost for this type of improvement is somewhere in the range of $1 million per mile.

10.1.3 Unbalanced Lanes

An unbalanced lane treatment provides additional capacity for roadways with higher directional volumes. Figure 10-3 illustrates an unbalanced lane scenario. Unbalanced lanes provide permanent directional travel lanes to a roadway, unlike the reversible lane, where one or more lanes change travel directions and/or use throughout the day, such as a two-way-left-turn-lane. Unbalanced lanes can also be placed on adjacent facilities and used similarly to one-way couplets to attract directional traffic to one facility or another. For example, one facility would favor eastbound traffic, while the adjacent facility would favor westbound traffic by providing additional capacity for the prominent movement on each roadway.

Figure 10-3. Unbalanced Lane Illustration



Unbalanced lane treatments are found all over the United States. The unbalanced lane treatment does not provide the same efficiency of traffic movement as a one-way couplet, but does allow prioritization of one prominent movement while maintaining two directions of travel. Similar to a one-way couplet, signal progression can be enhanced along the corridor to accommodate the predominant flow.

The unbalanced lane treatments are often not very expensive with roadways that already have the right-of-way to accommodate the capacity. The primary cost for these treatments is usually limited to striping changes and signal modifications. An anticipated cost for this type of improvement is somewhere in the range of $800,000 per mile.

10.1.4 Grade-Separated Interchanges

Grade-separated interchanges provide the best traffic mobility at a roadway and/or freeway intersection, usually at the greatest cost. Grade-separated interchanges are necessary when a surface street intersects a freeway, or when traffic volumes are too great to efficiently use a normal intersection or high-capacity intersection at non-freeway locations. The interchange accommodates large traffic volumes by providing a free-flow movement for one or two directions of travel, while managing the turning movements or through movements of the minor streets with traffic control devices.

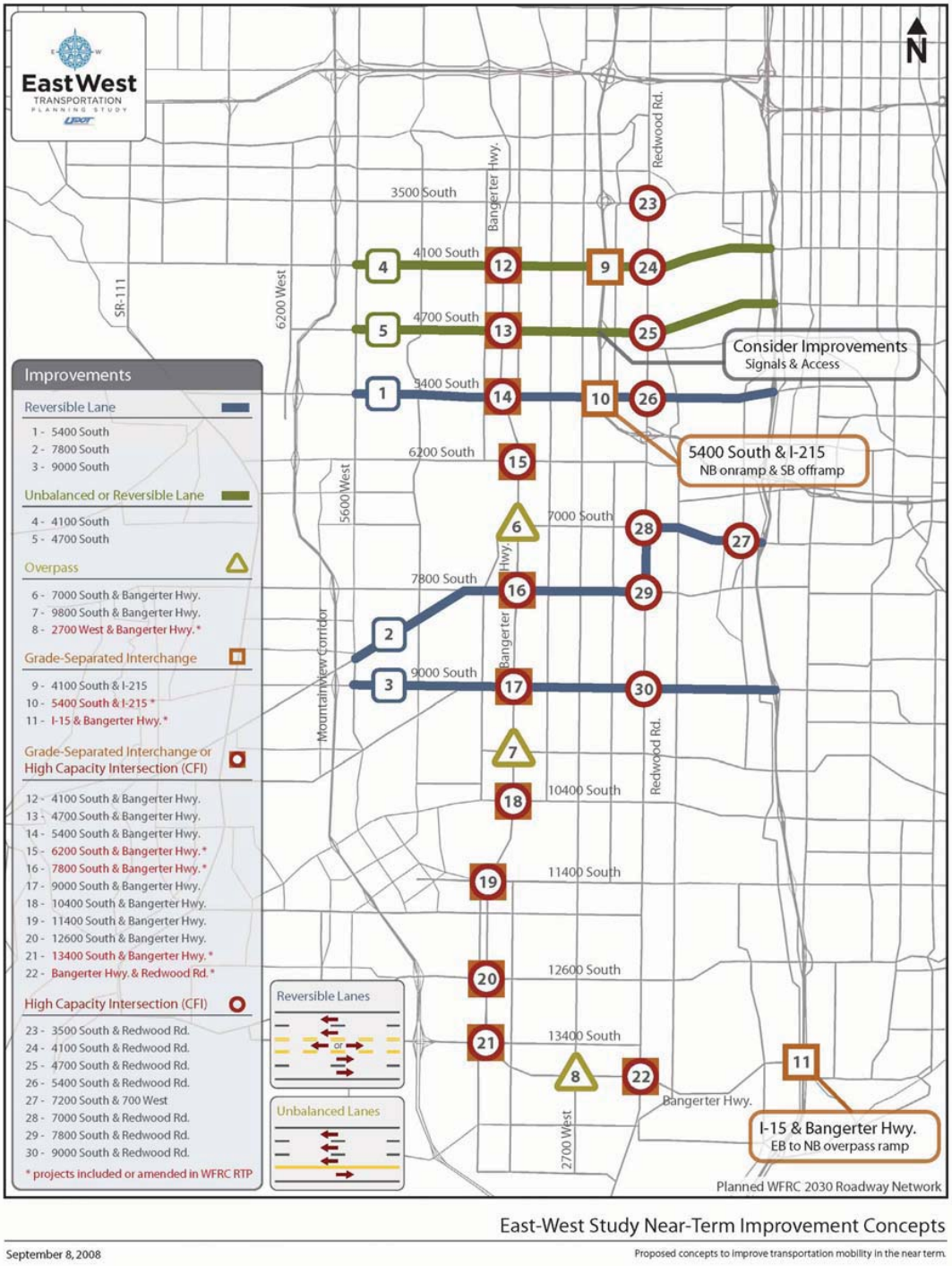
Grade-separated interchanges are usually expensive because of right-of-way costs and construction costs associated with required bridges and structures. Grade-separated interchanges are often difficult to construct in urban build-out conditions where right-of-way is limited and/or very expensive, and in some cases can result in major impacts to the adjacent area. On the other hand, interchanges provide excellent traffic mobility and can be planned and built in less urbanized and open areas without major impacts. Grade-separated interchanges range in cost from $25 million to $106 million.

10.2 RECOMMENDATIONS

The study team identified solutions that would improve the traffic mobility in the study area while at the same time being economical enough to allow implementation within the next several years. A focus of this effort was to provide system, or corridor, improvements that would improve the east-west traffic flow along an entire facility. Figure 10-4 illustrates the locations and recommendations for proposed near-term improvements. As depicted in the illustration, improvements were focused along key east-west facilities in the southwest quadrant of the Salt Lake Valley.

The following sections provide a brief description of the recommendations that were made for near-term improvements.

Figure 10-4. Near-Term Improvement Concepts



10.2.1 Grade-Separated Interchanges

Grade-separated interchange improvements, as shown in Figure 10-4, were recommended to improve congested intersections where grade separation was more appropriate and warranted. A few of the examples are either partial interchanges or grade-separated ramps to accommodate large traffic volumes. The two improvements proposed along I-215 at 4100 South and 5400 South will help relieve congestion on adjacent facilities that carry large traffic volumes mainly because of limited I-215 access.

The anticipated planning level costs for these improvements are listed in Table 10-1.

Table 10-1. Grade-Separated Planning Level Costs

Project Description	Total Cost[1]
4100 South and I-215	$70,000,000
5400 South and I-215	$25,000,000
I-15 and Bangerter Highway	$106,500,000
Total	**$201,500,000**

Other locations were identified that could either be improved with grade-separated interchange improvements or with high capacity intersection improvements. These locations and costs are listed in Table 10-2.

Table 10-2. Grade-Separated / High-Capacity Intersection Planning Level Costs

Project Description	Total Cost	
	Grade Separated Interchange	High-Capacity Intersection (CFI)
4100 South and Bangerter Hwy.	$48,000,000	$10,000,000
4700 South and Bangerter Hwy.	$48,000,000	$10,000,000
4700 South and Bangerter Hwy.	$48,000,000	$10,000,000
6200 South and Bangerter Hwy.	$48,000,000	$10,000,000
7800 South and Bangerter Hwy.	$48,000,000	$10,000,000
10400 South and Bangerter Hwy.	$48,000,000	$10,000,000
9000 South and Bangerter Hwy.	$48,000,000	$10,000,000
11400 South and Bangerter Hwy.	$48,000,000	$10,000,000
12600 South and Bangerter Hwy.	$48,000,000	$10,000,000
13400 South and Bangerter Hwy.	$48,000,000	$10,000,000
Bangerter Hwy. and Redwood Rd.	$48,000,000	$10,000,000
Total	**$528,000,000**	**$110,000,000**

10.2.2 High-Capacity Intersections

Eight locations were identified for high-capacity intersection improvements, as illustrated in Table 10-3. These locations are major bottlenecks in east-west and north-south traffic flow and would be greatly improved with high-capacity intersection improvements like the CFI. Other similar solutions would be acceptable depending on the overall improvement provided by the intersection treatments would improve the poor traffic conditions at these locations.

The anticipated planning level costs for these improvements are listed in Table 10-3.

Table 10-3. High-Capacity Intersection Planning Level Costs

Project Description			Total Cost
3500 South and Redwood Road			$10,000,000
4100 South and Redwood Road			$10,000,000
4700 South and Redwood Road			$10,000,000
5400 South and Redwood Road			$10,000,000
7200 South and 700 West			$10,000,000
7000 South and Redwood Road			$10,000,000
7800 South and Redwood Road			$10,000,000
9000 South and Redwood Road			$10,000,000
Total			$80,000,000

Table 10-2 in the previous section introduced 11 locations that could either be improved with grade separation or high capacity intersection treatments.

10.2.3 Overpasses

Several locations were identified for improvement with a grade-separated overpass. The overpass provides access to the intersecting roadway and provides free movement, without signal control, for both roadways by grade separating one roadway over or under the other (Table 10-4).

Table 10-4. Overpass Planning Level Costs

Project Description			Total Cost
7000 South and Bangerter Hwy.			$27,500,000
9800 South and Bangerter Hwy.			$27,500,000
2700 West and Bangerter Hwy.			$27,500,000
Total			**$82,500,000**

10.2.4 Reversible Lanes

Several reversible lane improvements were recommended to improve the capacity of three prominent east-west facilities. These improvements were paired with key intersection improvements to further reduce congestion and improve traffic flow. The anticipated planning level costs for these improvements are listed in Table 10-5.

Table 10-5. Reversible Lane Planning Level Costs

Project Description	Total Cost
5400 South	$6,500,000
7800 South	$8,000,000
9000 South	$6,500,000
Total	**$21,000,000**

10.2.5 Unbalanced Lanes

Two unbalanced lane improvements were suggested for 4100 South and 4700 South that would prioritize either the eastbound or westbound movement on each facility to improve the movement and flow of vehicles traveling east and west. An interchange, as identified at 4100 South, would likely be critical to ensuring the success of an unbalanced lane treatment on these two facilities. The anticipated planning level costs for these improvements are shown in Table 10-6.

Table 10-6. Unbalanced / Reversible Lanes Planning Level Costs

Project Description	Total Cost	
	Unbalanced	Reversible
4100 South	$3,500,000	$8,000,000
4700 South	$4,000,000	$8,000,000
Total	**$7,500,000**	**$16,000,000**

10.3 CONCLUSIONS

The study team worked together to developed a list of improvements that are economical and would provide noticeable improvement to the identified intersections and roadways without the high costs of traditional capacity enhancing/delay reducing improvements. These improvements would provide a lot of benefit to the study area by improving the major bottlenecks along Bangerter Highway and Redwood Road and would enhance the capacity of several major east-west facilities to further improve the overall mobility in the area.